

RECENT EXPLORATIONS TO THE SOUTH OF HUDSON BAY.

By Dr. ROBERT BELL, F.R.S., of the Geological Survey of Canada.

From 'The Geographical Journal' for July, 1897.



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THE existing maps of Canada show a large unexplored region south-east of James bay. My surveys and explorations of 1895 and 1896, in connection with the Geological Survey of Canada, have enabled us to construct a map showing the leading geographical features of the greater part of this large district. Its topography turns out to be very simple, the greater part of the region being comprised within the hydrographic basin of the Noddawai river, which falls into the head of Rupert bay.

Previous to 1895, it was known that a river had its source near the height-of-land in the vicinity of Grand lake, on the upper Ottawa, and that it flowed to Hannah bay, the central bight of James bay. While exploring in the upper Ottawa region in 1887, I sent my assistant, Mr. A. S. Cochrane, across the height-of-land to collect information. He made an approximate survey of about 70 miles of a stream, which the natives believed to be the Hannah bay river. His report on this work is contained in the Summary Report of the Geological Survey for 1887. During 1894, Mr. H. O'Sullivan, of the Crown Lands Department of Quebec, descended the same stream for about 30 miles beyond the point reached by Mr. Cochrane, but did not determine the destination of the river. In 1895 I crossed the height-of-land, which passes close to the northern extremity of Grand lake, and commenced an instrumental survey of the river from the point reached by Mr. Cochrane in 1887. At about 170 miles from the height-of-land, it was found to discharge into a lake, which the natives call Mattagami. My local Indian guide

* Paper read at the Royal Geographical Society, March 8, 1897. Map, p. 20.

knew nothing of the river that flowed from this lake, but he assured me from hearsay that it did not fall into the sea at Rupert bay, but somewhere further west. The existing sketch-maps represent the upper part of Hannah bay river as flowing across the route which I traversed, in such a way, that, if correct, a traveller following the water-courses could not help being carried to that bay. Waswanipi river, which is reached by the Hudson's Bay Company's people through a chain of lakes from a point on Rupert river, about 70 miles up, falls into the east end of Lake Mattagami. Both it and the river I descended are fully as large as the Ottawa, at the capital. The large river which discharges Lake Mattagami was ascertained by my actual survey to be identical with the Noddawai (= Iroquois), of which the mouth only had been previously located.

From the mouth of the Noddawai I carried the instrumental survey to Rupert's House, the position of which had been already fixed astronomically by Mr. William Ogilvie, of the Dominion Lands Department. The Noddawai appears to be the largest river flowing into Hudson bay, with the exception of the Nelson, which is one of the great rivers of the world. The Big or Fort George river has a longer course, but its catch-basin is much narrower, and the rainfall is apparently less in the region which it drains.

It will thus be seen that the river flowing from the height-of-land at Grand lake to Lake Mattagami, was confounded with the Hannah bay river, and that my survey proved the existence of a second large stream, which ultimately reached the sea at Rupert bay, in addition to the latter, and hence this stream, which was first partly explored by my assistant, and afterwards surveyed by myself, is really new to geography, and for the present I will call it the "new river." It was never indicated upon any map, and there appeared to be no name for it, which is not to be wondered at, as but few of the geographical features in this region possess names, and even these are only temporary. The few Indians who live in this part of the Canadian wilderness are quite indifferent to geographical terms. Rivers and lakes may be called by different names after various Indians who hunt upon them from time to time. Each band or family circle makes use of such designations as may suit its own convenience at the time, and these may not correspond with another limited set of names used by other families. Even these names are changed from time to time, so that an explorer may get from a party of natives a totally different set from those which had been given by other Indians to some previous traveller. They have no idea of a permanent geography and exact maps. The numerous large lakes and rivers of their country are commonplace to them. "Why should they not be large?" they say. "The Great Spirit has made both the land and the waters large." Small features near their favourite camping-places are more apt to receive names than the large ones, the latter being known

as "the big lake," "the long lake," "the round lake," "the big river," "the rapid river," etc.

The fact that this large territory has so few inhabitants is one of the various reasons why geographical names are so scarce. Another reason is that, in accordance with one of their prejudices, these people ignore almost everything which has been in use by other Indians. This applies to camping-grounds, pot-sticks, fire, implements, utensils, canoes, and geographical names, the idea being that it is derogatory to their pride to use anything second-hand as far as their own people are concerned, but not so in regard to white men. There is also the



DRYING OUT AFTER RAIN.

element of jealousy, which forbids them from adopting anything originating with others.

In this and all other wooded regions of Canada, our means of transport is the birch-bark canoe of the natives. This craft is still constructed just as it was before the advent of the white man in America. Nothing but the prehistoric materials enters into its construction. The rind of a mature canoe-birch tree is tough and durable, a roll of it having some resemblance to leather. The inner side is turned out to form the bottom, and the different sheets are sewn together by long split roots of the spruce, which are also used to sew the bark to a narrow frame or gunwale. It is lined inside by long strips of cedar, split as thin as cardboard, placed lengthwise, and held in position by light semicircular ribs of the same wood set closely together, their ends being caught between the inner side of the bark and the gunwale. The seams are made tight by the gum of any coniferous tree, neatly laid on. Canoes of this kind, from 12 to 30 feet

in length, are used on our surveys, and, as they carry a considerable load, we are enabled to take along with us all the provisions, tents, blankets, clothing, surveying instruments, hunting, fishing, and cooking apparatus, and other things required for several months' operations. Paddles or sails are used in smooth water, but in rapids setting-poles or tracking-lines are required. The falls on the rivers, and the intervals between the nearest bays of two neighbouring lakes, are overcome by carrying the light canoes and their cargoes on the backs of the voyageurs along the "portages," or trails, which have existed at such places from time immemorial. A small canoe can be readily carried by one man, and the larger ones by two to four men. Everything being in the form of handy packages, the cargo is quickly transferred from one end of the "portage" to the other. The ordinary portage load for a man is 200 lbs., and it is held upon his back by a pack-strap, or "sling," the loop of which is placed upon the forehead.

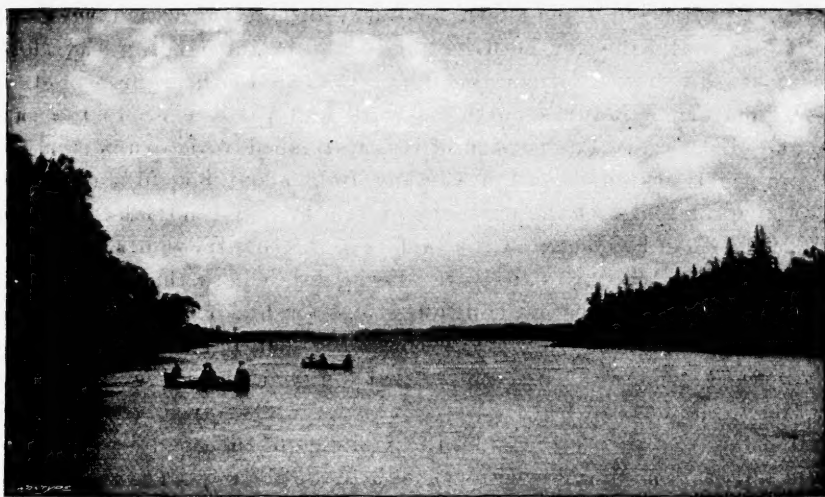
The white man has invented nothing to equal the Indian canoe for the purposes for which it is used. It is light and durable; it runs well, and is easily repaired; materials like those out of which it is built may be procured to repair damages at almost any place where an accident may happen, and the voyageurs understand how to make these repairs expeditiously. This is the canoe of history and poetry, the canoe of Longfellow's "Hiawatha," the same that was used by Champlain and the other adventurous missionaries who, in Canada's early days, explored the St. Lawrence, the Great lakes, and the Mississippi river. It is still used by most surveyors and explorers for all their transportation, and also by the Hudson's Bay Company to take in their goods and bring out their furs.

Except for the black flies, mosquitoes, and midges or sand-flies, there is much that is enjoyable and even fascinating in exploring the northern wilds of Canada by following the canoe-routes. In toiling up a rapid river, we may at any turn come face to face with a picturesque fall, never before seen by white man. After portaging across a divide, we may on the same day have the enjoyment of descending a swift-flowing stream, varied by the occasional excitement of running a dangerous rapid; or, in following a winding river, we may be surprised by its suddenly opening into a lake, so long that one cannot see the opposite end.

Much of one's success in carrying out these explorations depends upon having good voyageurs. The Indians, if well selected, are the best, although half-breeds are often very good. The party should be as small as possible, since it is easier to take along provisions and other necessities for a small number than for a larger one. Good voyageurs understand the work so well that few orders require to be given. In the evening, as soon as the head of the party has selected camping-ground, the canoes are quickly unloaded, and turned upside down to

dry. Every man has his appointed work to do, and he sets about it at once. In about one hour from the time of landing, all the tents are up, the blankets spread, and supper is ready. Our beds are made upon the ground with the tips of boughs of the balsam fir, or, in its absence, of the spruce. They are laid in regular order like slates on a roof, the lower surfaces uppermost and the stem ends sloping downward. They form a springy bed with a delightful perfume, which would soothe one to sleep if any help were needed.

It will be seen by the accompanying map that the general course of the new river is in continuation of that of the main body of Grand lake. The latter, in reality, lies in the same physical depression, and its waters flowed to the sea by way of this river at a comparatively recent geological



TYPICAL VIEW DOWN BELL RIVER.

period. The outflow of Grand lake through this depression has been arrested by the silting up of the channel at the spot where the waters now divide, owing to a slow differential elevation of the land to the north-eastward, which is still going on. The northward discharge of Grand lake might be restored by raising its new outlet a few feet, or by a slight excavation through the sand forming the present divide.

Having carefully surveyed the new river and the Noddawai in 1895 as a base for further operations, I spent the first part of the summer of 1896 in making approximate surveys of eleven branches of the former, while the second part of the season was devoted to the region between Guil lake and Rupert river, to be described further on. During the latter year, my assistant, Mr. R. W. Brock, made a track-survey of the Megiskun (Fish-hook) branch of the new river, and of a chain of lakes and streams from thence northward to Lake Waswanipi (Torch lake).

He also made a similar survey of the Waswanipi river, from the lake of the same name nearly to its source, from which he crossed to Lake Mistassini (Big-stone lake) and returned home by Lake St. John and Quebec.

The country explored in the two years measures about 280 miles, in a straight line, from north to south, by about 230 from east to west, and has an area of about 60,000 square miles, which is larger than that of England. The greater part of it is comprised in the hydrographic basin of the Noddawai river and its branches; but it also includes the country drained by a large stream between these waters and the Rupert river, locally known as the Broadback river, which falls into the mouth of the Noddawai. The whole region may be described in a general way as a nearly even plateau moderately elevated above the sea, the surface being broken here and there by isolated hills and ridges of no great height. Starting at the eastern boundary of Ontario, which runs due north and south, the southern height-of-land of the Hudson bay slope runs eastward not far from the upper Ottawa to the source of that river, from which it turns north-eastward and passes close to the east of Lake Mistassini. The portion of this watershed which runs near the Ottawa river has an elevation varying from about 850 to about 1050 feet above the sea. At the northern extremity of Grand lake it is not much more than 900 feet, and the surface of the country slopes gradually northward for 150 miles to Lake Mattagami, where the elevation is about 600 feet. The descent continues to be slight for the next 50 miles toward James bay, amounting to perhaps 150 feet, but in the remaining 80 miles the Noddawai river, and with it the general surface, falls about 450 feet to the head of Rupert bay. This main discharge receives only small tributaries from either side, the drainage of the greater part of the Noddawai basin having flowed together at Lake Mattagami as the central reservoir of the system. This Otchipwé word means "lake where the waters (or branches) meet," and is a very appropriate name. Lake Waswanipi, which is 10 miles long, discharges by the lower section of the river of the same name into this lake, the intervening distance being about 55 miles; but between them are Gull lake 30 miles long and a sheet of water 17 miles in length, which I have called Lake Olga. Navigation is interrupted by a chute known as the Red fall at the outlet of the latter, and by a rapid at the discharge of Gull lake.

My operations between Lake Waswanipi and Rupert river, in the latter part of the season of 1896, included track-surveys of the shores of Gull lake and of four other large sheets of water, besides a number of small ones, which together form a chain extending from it to Lake Namiska on the above-mentioned river. The lakes to the northward of Gull lake all discharge by the Broadback river, and several large streams flow into the chain from the eastward, three of them having their sources near Lake Mistassini. But only small streams are received from the westward, showing that the general slope of the country is from the east

all the way to the Noddawai river, broken only by this chain of lakes. Opatawaga (Sand-narrows) lake is the only one of the chain which has yet received a distinctive name. The largest one is known to the local Indians as "the big lake," and measures 30 miles from north to south; but as there are several other "big lakes" in this region, this is not a sufficient designation, and I propose to call it Lake Evans in honour of Sir John Evans, who is to visit Canada this year as President of the British Association for the Advancement of Science. As distinctive names are indispensable for convenience of description, I would suggest those now placed upon the map for other lakes and rivers to record the names of British scientists of the day. Gull lake is separated by narrows into three parts, of which the southern is the largest, while



ASPEN WOODS ALONG BANK OF RIVER.

Lake Evans is characterized by several long points and bays running north-east and south-west.

The Broadback river approaches within 6 miles of the southern bay of Lake Namiska on Rupert river, and then it turns west and falls into Rupert bay, about 11 miles south of the mouth of this stream. At this bend the Broadback river is flowing at a level of 50 feet below that of the Rupert, 6 miles due north of it, and throughout its course of 60 or 70 miles from this locality to the sea, it runs within a few miles of the latter stream, and descends about 300 feet.

The country between Lake Waswanipi and Rupert river may be described as tolerably level, with some isolated hills and ridges rising to heights of a few hundred feet. The lower or western part of the region between Lakes Waswanipi and Mistassini is also generally level, but as the source of the Waswanipi is approached the country becomes somewhat hilly at a distance from the river.

The plateau which has been described in connection with the new river and the Noddawai rests upon Archæan and eruptive rocks, and it extends far to the south-west of the basin of these rivers and also up the east side of James bay. Near the latter it assumes a steeper slope towards the sea, down which all the rivers descend in a succession of strong rapids. This slope or rim of the basin of James bay crosses the lower parts of the Rupert, Broadback, and Noddawai rivers, causing a rapid section of 60 miles or more in each of these streams. From the Noddawai river it trends inland to the south-westward, leaving a widening margin of low land as it recedes from the bay. The slope is marked by falls and strong rapids on the Abitibi, the Mattagama, and the Missinaibi branches of Moose river. At the crossing of the Missinaibi, this slope or rim has reached a distance of 150 miles south-west of the head of James bay, and, continuing thence to the westward and northward, it strikes the Albany river at 250 miles from the west coast of the bay and the Attawapiskat river rather further inland. This distinct rim of the basin of James bay is an important feature in the topography of the region. The low land between it and the southern and western shores of the bay is underlaid by nearly horizontal Devonian and Silurian rocks.

My surveys and explorations in the region to the south-east of James bay prove that its geography is quite simple, being principally that of one great river, which corresponds with the Moose to the south-west of the bay, so that we have here, as it were, twin basins of about equal area, with the Hannah bay or Washahow river occupying a narrower trough between the two. It will be observed by the map that the Waswanipi or east branch of the Noddawai divides into a number of branches spreading over a wide area, while the new river pursues a tolerably straight general course, which is continued by that of the main body of Grand lake, and by a chain of lakes connected by streams for about 40 miles still further southward. The portion of the drainage of the upper Ottawa which has been shut off from this river extends for about 60 miles to the southward and 90 miles to the eastward. Owing to this peculiarity in its recent geological history, the branches of the new river near its present head are as large as those further down, and they flow into the opposite sides of the trunk stream at about the same angles as the latter. The slope of the east side of the wide valley appears to be greater than that of the west. The largest branch is apparently the Megiskun, which, like the other branches from the east, flows with a rapid current down the slope of the main valley.

The former bed of the river on the present divide, at the north end of Grand lake, is occupied by a boggy swamp, and the canoe-route from the latter lies through three small lakes, connected by portages, near its western side to a small sluggish stream which falls into the head of Christopherson lake. Between this sheet of water and Lake Shabogama,

the new river expands into Simon and Obaska (Grassy narrows) lakes, the connecting links being interrupted by several rapids. Lake Shabogama is nearly 30 miles in length, and discharges from its north-western side, its name meaning "side outlet." The Megiskun branch falls in on its eastern shore, 3 or 4 miles from its upper extremity, among large marshes, formed from the silt brought down by this rapid river. Mid-way between lakes Shabogama and Mattagami, the river gives off a "lost channel" on the west side, which forms Ka-ni-qua-ni-ka, or the Long Island, 16 miles in length. Five falls or rapids occur in the last 18 miles of the river before it enters Lake Mattagami; but above these rapids, about 60 miles of the stream, following its course, would be navigable without interruption for steamers.

Most of the rapids of the new river consist of short chutes, having a descent of from 5 to 40 feet, with intervals of smooth water between them. On sounding the latter, the water was found to be unexpectedly deep, varying from 25 to 40 and even 80 feet. The width was generally from one-fourth to one-third of a mile.

The shores have generally a flooded appearance. The woods usually come to the water's edge, a distinct beach being rare even at low water. Sudden expansions occur at the terminations of narrow rocky parts, and here the water was always found to be very deep, as if each of these expansions had been a pool at the foot of a rapid when the channel was at a lower level, and the descent in the river-bed more rapid. Some of the branches from the south-west have very irregular and non-parallel shores, much divided into points, peninsulas, bays, lagoons, and culs-de-sac, showing a permanently flooded condition, while, on the other hand, old water-marks are found on the rocks at the east end of Lake Mattagami, 13 feet above the highest levels of modern times. On the east side of the northern extremity of the Long Narrows of Grand lake, 6 or 7 miles south of the height-of-land, there is a well-developed sand-spit, pointing north, which must have been formed when Grand lake discharged in that direction. These and other facts appear to be evidences of a differential uplifting of the land towards the north-east, with a corresponding lowering of the grade of the river, which has produced the existing flooded condition and turned aside the connection with Grand lake.

Such a change in the destination of the drainage of a large area could be made only on a nearly level plateau such as this. The height-of-land between the streams falling into Hudson bay and those which flow southward into the St. Lawrence, is not a ridge dividing the one set of waters from the other, but a nearly level strip of land, on which the upper branches interlock and sometimes curve about a good deal, as if undecided which way they should ultimately run. On the various watersheds of the Laurentian area, lakes of double outlet are not uncommon. Among such lakes connected with the Ottawa drainage

may be mentioned Temagami, Keepawa, Whitefish, Lac des Rapides, and one at the source of the Dumoine river.

A short range of greenstone hills, from which the timber has been burnt off, runs along the south side of Lake Mattagami, and forms a conspicuous feature of the landscape. The highest of these, which I have called Mount Laurier, after the present premier of Canada, rises to the height of 670 feet above the lake at its base, and is the highest "mountain" of the district, unless some of the hills south of Gull lake should be found to exceed it.

Lake Mattagami has a length of 25 miles from west to east, while its northern arm measures 16 miles at right angles to this course. Leaving this arm, the voyageur descends a short link of the Noddawai river, with two slight rapids, to Lake Soskumika (Slippery shores), an expansion of the river 33 miles long. In the next 40 miles there are occasional rapids, and a total fall of probably 150 feet. The remaining 50 miles, following the general course of the river, to the head of tide, is almost a continuous rapid, with a total descent of some 450 feet.

The effects of the "shoving" of the ice in spring are well exemplified along the Noddawai river and in the larger lakes of this region. On the river the ice forms to a thickness of 3 feet or more, and when this breaks up by the spring rise, heavy masses of it are shoved out of the water and up the shore by the pressure of the current. These ice-shoves take place at different points in different years according as the conditions are changed by local chance or circumstance. The heavy masses of ice often push before them great quantities of stones and occasionally large boulders, the courses of the latter being marked by deep grooves ploughed in the beach. Where the current is strong, curved points are apt to be formed of ice-shoved stones and boulders at places where the shore above trends in such a way as to favour the ice in shoving the boulders outward into the stream. The up-stream side of such a point shelves gradually up from the water, and is formed of closely packed stones and small boulders, while the down-stream side is steep, owing to the fact that the larger boulders are pushed to its edge and there dumped, so that they become piled upon one another at as high an angle as possible. Thus the point grows higher and higher above the level of the water on the lower side, the longer it increases in length and breadth. The accompanying illustration shows the dump or lower side of one of these points.

Where shoals or small islands occur in the larger lakes at such places as to catch the fields of drifting ice in the spring, boulders are shoved upon them from the surrounding shallows, and become piled as a wall all around above high-water mark. In some cases where a small islet is subject to ice-shoves from all directions, the boulders become pushed up so as to form a conspicuous pile or even a steep

cone. A remarkable instance of the latter occurs on the west side of Lake Evans.

At the Ice portage, the Noddawai river, during the spring flood, spreads to a great breadth, with numerous wooded islands, but at low water it is confined to a few swift narrow channels, while all the rest of the bed of the stream, several square miles in extent, becomes a dry field of boulders. Some of the latter are of great size. One of the largest of them, about 20 feet in height, is shown in the illustration on p. 13.

Middleton island, 15 miles northward from the head of tide, and 11 miles southward from the mouth of Rupert river, may be considered to be at the mouth of Noddawai river. Broadback river falls in just



POINT FORMED BY ICE-SHOVED BOULDERS.

above this island, and it might therefore be considered as a branch of the Noddawai. On account of its depth and strong current, the latter discharges a greater volume of water than might be supposed from its width. From the mouth at Middleton island up to the junction of the Kitchigami river, a distance of 25 miles, it has an average breadth of 2½ miles. Thence, up to the main body of Lake Mattagami, a further distance of about 130 miles, the general width is from one-third to half a mile. The average breadth of Lake Siskumika and the north arm of Lake Mattagami, included in this distance, is 2 miles.

As to the total length of the Noddawai river, although its catch-basin measures only about 230 miles in a straight line, if we allow for the curves in the main stream and those of its branches up to the head of the longest affluent, it has probably a course of about 400 miles or more.

The precipitation over the area which it drains is evidently greater than the average of Canada. One reason for this appears to be that the prevailing warm south-westerly winds of summer carry large quantities of moisture across the height-of-land, which, being chilled as they pass over the continuous and cool evergreen forests of the region, cause the copious rains of which we had unpleasant experience during the past two summers. In winter the snow is said to accumulate to an average depth of about 4 feet. The moss, which grows everywhere in the deep shade of the coniferous trees, retains the water like a sponge after a heavy rain, and allows it to drain away gradually. The brushwood and fallen timber, which obstruct the flow of water in the innumerable small streams all over the country, tend to equalize the water-supply. The generally level nature of the region is also favourable to slow drainage, and the numerous lakes connected with all parts of the river-system form reservoirs to maintain a steady flow. From such reasons as these, the volume of water in the main river does not fluctuate greatly at different seasons like that of the Ottawa.

The region under description promises to be rich in some kinds of economic minerals. The Huronian rocks, which constitute our most productive ore-bearing system, are largely developed within its borders. The great belt of these rocks, mingled with eruptive greenstones and granites, which runs from Lake Superior to Lake Mistassini, attains its maximum width in this region, and measures 150 miles on a line drawn straight north from the head of Grand lake to Lake Mattagami. A considerable proportion of the Huronian system of the district consists of various kinds of crystalline schists and pyroclastic rocks. These and the greenstones are intersected by numerous veins of quartz, many of which have a promising appearance for gold. Iron pyrites in economic quantities, and containing copper, was found in several localities on the Broadback river.

The soil of the greater part of the district appears to be suitable for agriculture. On the lower levels it consists of a thinly laminated brown clay resting on till. This clay is exposed in the banks of nearly all the rivers we explored, while on the higher grounds, sandy, gravelly, and loamy soils prevail. The waters of the Waswanipi are clear, but those of the new river and its branches, as well as of the Noddawai and the lakes of the Broadback, are turbid, from which it may be inferred that the clay prevails over a very wide area. The solid rock is to be seen principally in the hills, at the rapids in the streams, and on the shores and islands of the lakes.

The whole region is well wooded with a variety of our northern species of trees. The white and red pines (*Pinus strobus* and *P. resinosa*) extend to Obaska lake, the black ash (*Fraxinus sambucifolia*) to Gull lake, and the white cedar (*Thuja occidentalis*) to the outlet of Lake Evans. It is a curious fact that only a few clumps of the balsam poplar (*Populus*

balsamifera) are found along the upper part of the new river or in the region around Grand lake, although this tree is abundant for hundreds of miles further north. The area in which it is lacking is a south-westward extension of a very large one in central Labrador, where this tree is not known to occur, although it grows in a wide belt all around it. The staple timbers of our region are the black and white spruces (*Picea nigra* and *P. alba*), which are everywhere the most common. The other conifers, in the order of their abundance, are the Banksian pine (*Pinus Banksiana*), the tamarac or larch (*Larix Americana*), the balsam fir (*Abies balsamea*), and the white cedar (*Thuja occidentalis*). The deciduous trees are the canoe birch (*Betula papyracea*), the aspen (*Populus tremuloides*), the



HUGE BOULDER AT ICE PORTAGE.

black ash already mentioned, the rowan (*Pyrus Americana*), the bird cherry (*Prunus Pennsylvanica*), and, in the northern part, the balsam poplar. Near the streams and lakes many of the white spruce trees attain a diameter of 2 to 2½ feet, and these, like the pines, may be manufactured into sawn lumber, while the smaller spruces will be valuable for making paper pulp. The spruces, Banksian pine, tamarac, and white cedar may be utilized in construction, fencing, etc., for fuel, railway ties, spars, telegraph poles, mine timber, charcoal-making, and a variety of other purposes, while the timber of the deciduous species may be employed for many purposes. The tamarac trees have been mostly killed by an imported saw-fly, but this pest has disappeared, and a new growth will spring up. Both the canoe birch and the balsam fir attain a large size, which is evidence of a good soil. Unlike most of our coniferous forest regions, the timber of this district has suffered comparatively little from bush fires. There is a

burnt tract to the south of Lake Waswanipi, but throughout the rest of the district we saw only a few small spots which had been damaged by fire, so that the region, as a whole, may be considered as clothed with green timber. On passing to the south of the height-of-land, several kinds of trees make their appearance which are not seen to the north of it.

The climate of the region in question is much better than is commonly supposed. Our district extends from latitude $47^{\circ} 45'$ to latitude 51° , the latter being south of that of London. Although it does not enjoy any exceptional advantage for these latitudes, neither does it suffer from the cold current of the western Atlantic, from which it is more than 1000 miles distant. The low altitude of the plateau is greatly in favour of its climate, which may be considered as normal for the above latitudes.

Wheat is successfully cultivated around Lake St. John, at the head of the Saguenay river to the east, and it has been found to ripen on the Abitibi and Missinaibi rivers to the west, where it has been tried on a small scale. If we draw a line connecting these localities, it will pass through the centre of our region, and it may be presumed that wheat will thrive throughout the tract from this line southward, if not to the north of it. Early in the spring of 1896 I sent small quantities of wheat and oats to the gentleman in charge of the Hudson's Bay Company's post on Lake Waswanipi, who is the only white person in the whole district. These samples were sown, and the wheat was nearly ripe when I visited the place in the middle of last August. Barley had been successfully raised at this post for many years. In the garden, peas and beans and all kinds of root crops were thriving well. Potatoes had always been a great success, and timothy grass and two kinds of clover were growing in a field. Indian corn was under trial for the first time, and it had put forth its silk at the above date.

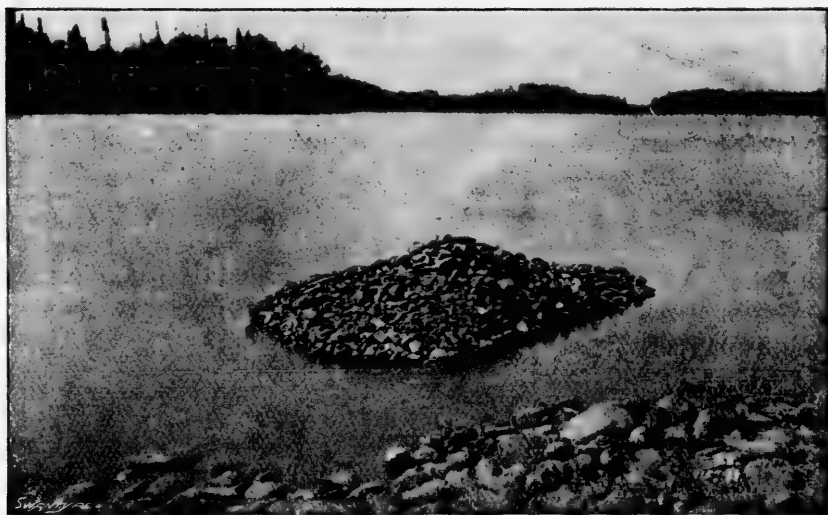
Barley and all kinds of root crops have long been grown at Rupert's House and Moose Factory, which lie beyond the northern limits of the whole district. In untried regions we may be guided, to a great extent, as to the prospects for successful agriculture by the natural flora. It is generally conceded that wheat will ripen wherever the mountain maple (*Acer spicatum*) and the saskatoon (*Amelanchier*) are to be found, and these bushes or small trees extend into the northern parts of the district.

There appears to be little doubt, therefore, that wheat and the coarser grains will ripen over a large portion of this region, and it may be assumed that hay, potatoes, and all the ordinary root crops will grow throughout the whole area. Independently of grain-growing, we have, therefore, in this new region a very large amount of good land that will some day prove valuable for stock and dairy farming, which are now the most profitable branches of agriculture in Canada. At the posts of the Hudson's Bay Company on James bay, splendid cattle have been

raised for more than a hundred years from improved stock imported from England and Scotland.

If two-thirds of the land in the district above described should prove to be good, it would amount to 25,000,000 acres. The region is practically inaccessible without a railway, which, however, might be easily built from Quebec, Montreal, or Ottawa.

The territory I have described is far south of the country of the Eskimos, whose most southern visits only extend to Cape Jones, 300 miles north of the mouth of the Noddawai. The few aborigines who live in the district explored belong to the Northern Cree branch of the widespread Ojibwé, or Cree stock. This tribe, divided into more than



CHUB NEST PARTLY EXPOSED.

twenty branches under as many different names, extends from Newfoundland to the Rocky mountains. In the Labrador peninsula they come into direct contact with the Eskimos, but on the west side of Hudson bay, the Chipewyan tribe intervenes. In the region described in this paper they are very few in number, only some thirty or forty families living in the whole district, or one family to every 1500 or 2000 square miles. They are an honest and inoffensive people, with many polite instincts, and they are very friendly to any white man they may chance to meet, but only one resides in the whole region. They devote most of their time, both summer and winter, to fishing and the pursuit of game for food; but during the winter they also trap furs to trade with the Hudson's Bay Company for such European goods as they require.

As to the fauna of the region, mammals are not abundant, but in

the southern part of the district there are a few moose and Virginia deer, and the caribou, or woodland reindeer, is found in small numbers throughout the whole region; also the black bear, the beaver, musk-rat, Canada porcupine, lynx, wolverine, otter, skunk, fisher, marten, mink, foxes, and wolves. The American hare is the most common and useful mammal. The Indians, as well as some of the wild animals, depend largely upon it for their living in winter. Water-fowl are not plentiful, as they prefer to go to districts where wild rice is to be found. The ruffed, Canada, and pin-tailed grouse occur rather sparingly at all seasons, and the willow ptarmigan migrates southward to this region in winter.

Salmon and trout are entirely wanting, but other fishes abound in the waters, the commonest species being sturgeon, pike, pickerel, gold eyes, fresh-water ling, suckers, and chubs. The last-named fishes are called *avadosi* ("stone-carriers") by the Indians, from their habit of collecting gravel and stones, weighing from less than one ounce up to about one pound, and depositing them in a heap in the bottom of a river at a suitable spot for hatching their eggs, which are placed in this singular nest. This is done in the spring. A larger or smaller number of the fishes, whose bodies would weigh from a pound to three or four pounds, work together to build the nest, the size of which will depend upon the number of workers. They pick up the stones with their mouths, and bring them to the heap, one at a time, from far and near. These nests are made in tolerably shallow water where there is a moderate current, which favours the hatching of the ova. Their form is generally conical, and they contain on an average a cart-load of gravel and stones, but they vary from a wheelbarrowful up to four and five tons. The fact that the stones weigh fully one-third less under water than in the air helps to account for their ability to carry the larger ones, which may be seen in hundreds on these heaps.

It may appear strange that the greater part of this region should have remained unexplored until now. But the reasons are not far to seek. Although its southern border is only 180 miles in a straight line, north of the city of Ottawa, the region is not easy to reach by present means of travel. It had no attraction for any one but government explorers, who were few in numbers, and they had always been fully occupied elsewhere. Fur-bearing animals were not plentiful, and very few aborigines lived in the region; its rivers formed no part of the routes travelled by the Hudson's Bay Company's people. It formed only a small part of the unexplored regions of Canada, which are more extensive than any others in the world at the present time. Owing to this combination of circumstances, it remained unknown to geography, notwithstanding that it was the most southern of our unexplored districts, but it now proves to be a very valuable part of the Dominion.

If a railway were built from Quebec, Montreal, or Ottawa, this

district could be reached in a few hours, and Quebec is within a week's sail by fast steamers from the British islands, so that we have here a large habitable territory which may be opened for settlement, and made easily accessible to immigrants from Europe. One of the advantages offered by this region to the settler is the fact that, notwithstanding its present wild condition, it is well understood that law and order prevail in every part of the Dominion, and that life and property would be as safe in this district as if it formed a part of England itself.

Before the reading of the paper, the Chairman (Admiral WHARTON) said : We are very glad to welcome here to-night a fellow-Englishman from the great Dominion of Canada, of which we are all so proud as an offshoot of our vast empire. He has been journeying in a part of that vast country not so very far from civilization, but which has rather strangely up to the present day been very little known, and which has proved a very interesting country indeed. I will call upon Dr. Bell to read his paper.

After the reading of the paper, the following discussion took place :—

Colonel HARRIS : It is with great pleasure that I have heard the paper read by Dr. Bell. It may not be known to many of you that in this hall in 1881 Dr. Bell read one of the most important papers ever published, and I recommend any of the Fellows who may be interested in Canada to go to the library and read that paper. With an enlightened mind, it shows the capabilities and wonders of the Dominion of Canada, and it was published in October, 1881. Dr. Bell is not only eminent as an explorer, but he is also eminent as a geologist. To-night we have heard of these great rivers which run into St. James bay, and thence into Hudson bay. In the paper read in 1881 he clearly demonstrated and showed that this was navigable for commercial purposes. Many believe that Hudson straits and bay are frozen over and perfectly useless for commercial purposes. If you read that paper you will alter your opinion; you will be able to see that these rivers he has spoken of are open to the sea, and can be made commercially valuable. He has told us to-night that the immense forests adjoining James bay clothe this land which he thoroughly explored. Tens of thousands of acres of this magnificent timber can only be made use of by bringing it to England or other places by water. If I am wrong the Doctor will soon set me right. It was only three days ago I read a paper showing the actual work done by Dr. Bell. It said his thirty years' work was now bearing its fruit. In speaking of the mineral riches of Canada, Dr. Bell, as a geologist, has done a great work, and to prove this assertion let me read this report, dated Ottawa, 23rd of last month. "The mineral output of Canada last year was \$23,427,000, an increase of \$1,500,000 over the previous year; the value of the Dominion production has doubled during the last ten years." Dr. Bell has done a great work for Canada as a geologist and explorer; and when you look at him now after thirty years' exertion, I don't think you will find it has done him much harm. I delight to meet him to-night, after many years' hard work for the benefit of mankind. I am sorry time does not permit him to go into the advantages of these rivers flowing into Hudson bay for the conveyance of metals and timbers. I would like to know from him to-night whether he has the same opinion as he had fifteen years ago—if Hudson bay is navigable and Hudson bay is useful for the purposes of navigation for the benefit of mankind.

Dr. BELL : I should have been pleased to speak more at length on the subjects referred to, but did not wish to detain this audience. However, as Colonel Harris

has spoken, I would like to make a few remarks before we separate. He has been good enough to congratulate me on standing the fatigues of exploration for thirty years. I should tell Colonel Harris that I have completed forty years of this sort of thing, and I do not know that I am much the worse for it. I have not suffered much harm from having slept on the ground for forty years. I have not changed my mind in reference to the utility of Hudson bay as a means of reaching the interior. It may seem strange to you that a port on the west side of Hudson bay is nearer Liverpool than Montreal. Quebec is about the same distance from Liverpool as Churchill in Hudson bay. Now, if it is possible to reach this port in a commercial way, you see the advantage to that territory. If we can reach Churchill from the centre of the habitable parts as soon as we can get to Winnipeg, and as Churchill is as near Liverpool as Quebec, we save the whole distance from Winnipeg to Quebec, because Churchill is no further from the centre of the north-west than Winnipeg.

I have said I believe, on the average, the bay and straits might be navigated for four and a half months in the year, from all the information I could obtain when I read that paper, and this is practically all we can do at Montreal and Quebec. For the middle months of the summer it is usually navigable for all kinds of ships, and consequently we have here an easy means of access to the centre of North America. When that route will be opened depends on the pressure of business from within, but the time will come, there is no doubt, when one railroad will not be sufficient to carry the products of that region to market.

Admiral WHARTON: I think, as we look at this map, that it will strike us as very extraordinary that this country which Dr. Bell has explored, and this very large river he has found, have never been examined before, and it shows us what an immense country Canada is, and also, up to the present time, how comparatively sparse the population is. Trade and civilization have followed the broad valley of the St. Lawrence, the Great Lakes, and the rich country beyond, and this country close to Ottawa and Montreal and the earlier settled parts has been comparatively overlooked. The description that Dr. Bell has given us of the country there will, I think, make us rather envy the lot of the Geological Survey officers of Canada. It is most delightful travelling in these woods, of which I have had a little experience, and I look back to those days with the greatest pleasure. One forgets the mosquitos and black flies—perhaps Dr. Bell is so used to them that they do not trouble him any more—but, except for that, these forests of North America are most delightful places to wander about in, whether exploring, fishing, or shooting. Dr. Bell knows the whole of that enormous territory, and no man, as Colonel Harris has said, has done more to open out and find out the capabilities of Canada than Dr. Bell. There are two very remarkable things in what he has told us: one is the number of lakes that have more than one outlet. Take the world at large, it is most unusual to find lakes with more than one outlet, and I suppose it is simply an evidence of the flatness of the country, for where there is a general fall of land, lakes can hardly have more than one outlet. I have never heard that there are in any other district many lakes with more than one outlet. The other is the remarkable fish, which is quite new to me. I wish some zoologist were here to-night to tell us something about this chub that builds piles of stones.

It is a great consolation to hear from Dr. Bell that he thinks the forests of Canada recuperate themselves nearly as fast as they are destroyed by fires. That they are so destroyed is unfortunately well known, and it is a great consolation to know that they are growing up so fast. One of the things we look forward to with terror is when the great forests of the world will have been destroyed, and we shall be hard up for wood.

I am sure you will all join with me in giving Dr. Bell a hearty vote of thanks for his interesting paper.

DR. BELL'S MAP.—The map has been compiled from the Instrumental and "Track" Surveys of Dr. R. Bell in 1895 and 1896, with additions from the maps of the Geological Survey of Canada, the Crown Lands Department of the Province of Quebec, and sketches by Indians of the country. The astronomical positions of Mr. H. O'Sullivan have been adopted. Dr. Bell was assisted by Mr. R. W. Brock in 1896.

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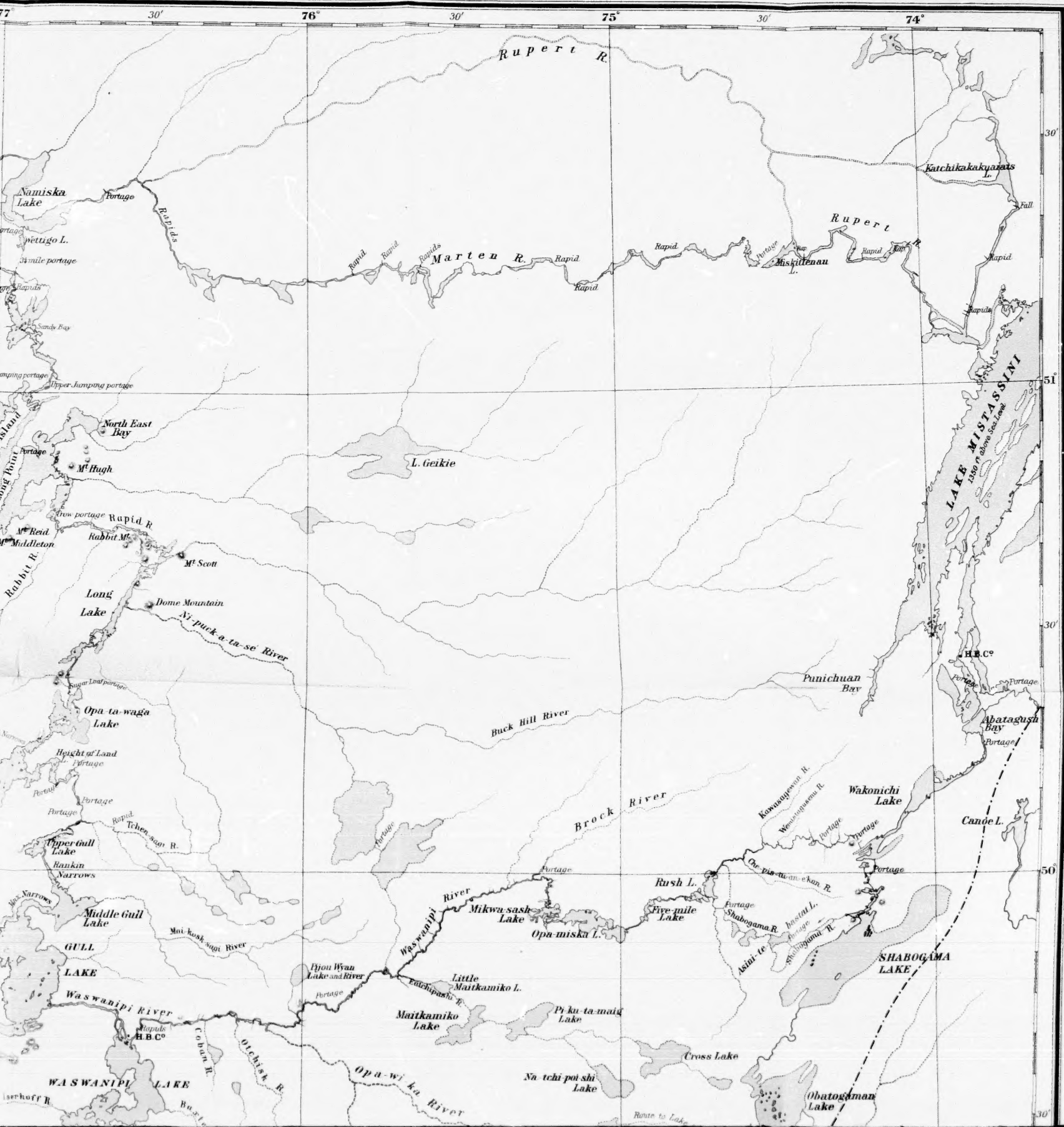
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